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DISCUSSION

Dr Kimberley Hansen (*Winston Salem, NC*). Dr Mitchell, Dr Endean, members, and guests: Thank you for the opportunity to open this discussion, and thank you Ali for your paper well in advance and your presentation this morning. For me, the primary message from Dr AbuRahma and his group is that optimal criteria for renal duplex sonography are best obtained when each laboratory validates its results through comparative analysis. We agree wholeheartedly with this message, but the comparison may not be so easy to make as it once was. Some years ago, our first comparative analysis between renal duplex and angiography utilized cut film, not temporal digital subtraction. Digital subtraction with postprocessing—peak opacification and pixel shift functions—can affect images profoundly. With an analog-to-digital imaging system, our technologists can create just about any image you might prefer, bringing me to these questions:

1. Who created the final subtracted angiogram for comparison?
2. Do your angiograms reflect analog-to-digital or digital-to-digital technologies?
3. In the absence of poststenotic dilatation or collaterals, how confident are you that 50, 60 and 70% lesions can be delineated one from the other?

More than any particular velocity cut point, the significance of a renal artery occlusive lesion depends on the clinical setting in which it occurs. In this regard, our group has considered severe hypertension as the clinical hallmark of physiologically significant renovascular disease, leading to these questions:

4. The majority of patients were considered to be hypertensive. How many patients had severe hypertension of the variety most consistent with a renovascular etiology?

5. Did the severity of hypertension vary with renal artery peak systolic velocity?

One last point: Velocity criteria for renal duplex will likely vary from laboratory to laboratory, but the added value of renal aortic ratio is uncertain. When Gene Strandness and Ted Kohler introduced renal aortic ratio in the early and mid-1980s, the supporting rationale was that velocities in the renal artery were dependent on inflow aortic velocity. In reality, renal blood flow is determined by autoregulation provided by the kidney. In large groups of volunteers, as well as patients, there is no association between peak aortic and peak renal artery velocities. For us, renal aortic ratio has proved to be a spurious correlation. The correlation with disease has rested entirely with renal artery peak systolic velocity. I enjoyed this paper and thank the association for the privilege of the floor.

Dr Ali F. AbuRahma. Thank you, Kim, I appreciate your constructive comments, and I am honored that you were the discussant for this paper. All of us are aware of your contributions on this subject, and they are appreciated. In regards to questions 1 and 2, the technical staff completed the digital subtraction angiograms and they were digital-to-digital, which is compatible with most modern technology. In regards to question 3, as to how confident we were in measuring 50%, 60%, or 70%, we were certainly confident, particularly since our measurements were based on either ≥50% or >60%, and we did not look to >70%, since it has no practical implication, at least at this stage. Two observers made the determination and if there was a difference of ≥10%, a third observer was selected and a consensus was reached. In regards to question 4, as noted in our presentation, over 90% of the patients were hypertensive and a majority were labeled as having severe hypertension (ie, a diastolic blood pressure of over 100 or a systolic blood pressure above 180); however, we did not classify patients according to the degree of hypertension.

In regards to the severity of hypertension and its relation to peak systolic velocity, as indicated earlier, we have not classified this accordingly; however, we are aware of the fact that velocities can vary in patients with cardiovascular disease. Therefore, we analyzed not only peak systolic velocities, but also the renal-aortic systolic ratio, and we found that a ratio of ≥3.7 was somewhat equivalent in its value to a peak systolic velocity of 285. Again, thank you for discussing this paper.